INTERNATIONALISATION OF NEW PRODUCT DEVELOPMENT AND RESEARCH & DEVELOPMENT: RESULTS FROM A MULTIPLE CASE STUDY ON COMPANIES WITH INNOVATION PROCESSES IN GERMANY AND INDIA

ALEXANDER BREM
Mads Clausen Institute, University of Southern Denmark
Alsion 2, DK-6400, Sønderborg, Denmark
brem@mci.sdu.dk

FLORIAN FREITAG
School of Business and Economics
Friedrich-Alexander-Universität Erlangen-Nürnberg
Findelgasse 79, 90402 Nürnberg
freitag@idee-innovation.de

Published 17 December 2014

A rich body of literature has emerged from research on Western new product development (NPD). However, the impact of country- and culture-specific influences on these processes has not been examined in detail yet. Hence, this study identifies the differences in NPD practices between the Indian and German research and development (R&D) subsidiaries of multinational companies (MNCs). Data have been generated by interviews with R&D executives in both countries across multiple cases. The study samples strategic, organisational, and operational aspects and indicates differences in process coordination, reward systems, NPD creativity techniques, market orientation, and the average age of NPD teams. Other aspects, such as top management support, the use of structured NPD processes, and the use of heterogeneous NPD teams, show no substantial differences between the countries. Our findings suggest that, while some aspects are universally applicable across cultural frontiers, Western companies must understand India’s different expectations regarding NPD and adjust their practices accordingly.

Keywords: Innovation process; R&D Management; New Product Development; Internationalization; India; Germany; Emerging markets.
Introduction

In the last 10 years, the face of innovation and its management has changed. The main driver for this development is the changing role of Asian countries like India and China (e.g., Agarwal and Brem, 2012). Multinational companies (MNCs) used to rank emerging market economies primarily as low-cost locations for routine operations, while most of their research and new product and service development was carried out in the home country, as the creation of new technology was geographically sticky to a company’s headquarters (Patel and Pavitt, 1991). However, research and development (R&D) activities began to shift to developed countries outside of the home countries, producing a few preeminent centres of innovation within the triad of North America, Japan, and Western Europe (Ernst, 2005; Karlsson, 2006; Bruche, 2009). Since around the turn of the millennium, foreign direct investment (FDI) from Western multinational firms into R&D in developing countries has increased progressively at the expense of R&D investments in developed countries (UN, 2005).

Now, MNCs see enormous business and market opportunities in those markets, and have located operations of higher value — such as sales, marketing and, more recently, R&D — in these economies (Deloitte, 2007). As a result, today’s R&D map is far more geographically dispersed across the globe, with more centres for innovation than ever (e.g., Cantwell, 1995).

This paper examines the implications of this worldwide spreading of R&D processes on the innovation processes of MNCs, focusing on the example of India. First, we analyse the literature on R&D and its management in India and introduce the three main dimensions of analysis, namely strategy, organisation, and operations. Our empirical section presents the results of the analysis of four companies pursuing R&D activities in Germany and India. Finally, we discuss our findings as well as the study’s limitations; we then provide an outlook on future research.

India attracts foreign R&D operations

The number of innovations developed by MNCs in emerging economies have significantly increased, and India and China have emerged as prominent countries in MNCs’ global R&D map (Bruche, 2009; Zeschky et al., 2011). A survey conducted in the manufacturing industry by Deloitte in 2007 presented the projected directions for internationalising R&D. As shown in Fig. 1, China and India come first and second.

The most frequently cited motivations for relocating R&D to emerging economies are the wish to obtain a better understanding of the market, a faster time to
market, lower costs, government incentives, and new ideas (Deloitte, 2006; see also Fig. 3). The wish to access the most talented R&D personnel and exploit pools of skilled labour emerged as further important drivers (Manning et al., 2008; Economist Intelligence Unit, 2004). However, labour cost advantages begin to lessen as competition for skilled employees rises (Deloitte, 2006).

A survey on the changing importance of the strategic drivers of offshoring decisions, as shown in Fig. 2, describes a notable shift over the years 2004, 2005, and 2006. The lower costs of labour still ranked in first place; however, the access to qualified personnel gained importance. In the short span of just two years, this driver’s importance increased by 26%.

A total of 60% of consulted executives rated a better understanding of the local market as the most decisive factor for relocating R&D to emerging countries (Deloitte, 2007). India’s market incorporates features that vary greatly from Western economies. Its nominal gross domestic product is the ninth largest in the world and it is ranked third in the world by purchasing power parity. Despite being one of the fastest growing economies in the world, India is only rated a lower-middle income economy by the International Monetary Fund (Sithemsetti and Borstorff, 2012).

The demand for the so-called “good enough” products is a challenge for producers, especially for Western multinationals and their differently oriented business models (Zeschky et al., 2011). This so-called “frugal innovation” means more than just adapting a product. It means innovating in reverse in order to “strip the products down to their bare essentials” (Economist, 2010: 7), reflecting the needs of price-sensitive and financially constrained consumers, who would otherwise be non-consumers. At the same time, the face of the Indian market is changing with
the rise of a new middle class that has become an interesting part of a market that offers great business potential (Agarwal and Brem, 2012; Zeschky et al., 2011).

This potential, manifested in the emergence of new clusters in India, is providing talent and up-stream services (e.g., software development, product design, engineering) to MNCs. Bangalore, a metropolis in the State of Karnataka in South

Fig. 2. Changing importance of strategic drivers of offshoring decisions.

the rise of a new middle class that has become an interesting part of a market that offers great business potential (Agarwal and Brem, 2012; Zeschky et al., 2011).

This potential, manifested in the emergence of new clusters in India, is providing talent and up-stream services (e.g., software development, product design, engineering) to MNCs. Bangalore, a metropolis in the State of Karnataka in South

Fig. 3. Key benefits from local R&D.

Note: Percentage of executives rating the benefits of locating R&D in emerging markets as extremely or very important.
India, has become a cluster for science and engineering (S&E), which attracts a large number of MNCs searching for specialised skills and S&E talent (Manning, 2008). The city of Bangalore has become a centre of excellence for information and communication technology and is one of India’s software hubs (Caniels and Romijn, 2003). By sharing in those clusters, companies can benefit from the dynamics of those S&E regions and harness technology developed by other companies (Karlsson, 2006).

**National culture affects organisational processes**

“*You cannot simply take a North American version of a business practice, move it to China or India, and just flip the switch. It won’t work.*”

Director of Global Process Optimization at a major U.S.-based manufacturer (Deloitte, 2007: 4).

Many scholars have contributed to the literature on innovation practices and success factors in Western and developed economies (Barczak et al., 2009; Grinstein, 2007; Cooper et al., 2004a, 2004b, 2004c; Griffin, 1997). However, literature on innovation practices in India published in English is scarce. Studies in this discipline have produced contradictory findings on aspects of innovation as support for organisational structures within firms. Some organisational shapes condemned as repressive towards innovation in the Western literature have been found to have positive effects on innovation in the Indian business environment (Prakash and Gupta, 2007).

This finding is in line with research conducted by the Economist Intelligence Unit (2004) on the internationalisation of R&D activities. On the one hand, the standardisation of the R&D approach is mentioned as one of ten principles of international R&D success. However, another principle is described as “*Don’t underestimate cultural differences*” (Economist Intelligence Unit, 2004: 16). Thus, cultural differences should be embraced and taken into consideration when determining an offshore R&D subsidiary’s space. As different cultural backgrounds are in play, the challenge is to create the right balance between independence and similarity in the R&D activities of different countries. These principles are endorsed by other scholars, who state that the implementation of standardised processes is inefficient in culturally inconsistent markets. Griffith et al. (2000) found that standardisation is applicable across nations featuring similar cultural characteristics but is inappropriate across nations featuring different cultural types. In another context, Lindholm (2000) researched the possibility of standardising...
human resource management practices across nations. Again, he found that practices must be modified before they are applied to other cultural contexts. Newman and Nollen (1996) stated that business performance improves if management practices are congruent with the values of the external national culture. This is in line with research in the context of internationalisation of R&D (Brem and Ivens, 2013).

A major work on national cultures by Hofstede (2001) claimed that the cultures of Germany and India are significantly distinct. The cultural dimensions Power Distance, Uncertainty Avoidance, Individualism versus Collectivism, Masculinity versus Femininity, and Long Term versus Short Term Orientation were evaluated across more than 50 countries. In all categories, India and Germany scored substantially differently; thus, one can legitimately claim that Germany and India are characterised by big cultural differences.

A more recent publication by Hofstede et al. (2010) shows that cultural differences on the national level affect firms’ organisational processes. The affiliation of an individual to a company and therefore to an organisational culture influences daily practices rather than underlying cultural values. Hence, beyond the superficial organisational culture, which manifests in shared practices, lies the deeper level of culturally conditioned values. Interviews with project managers have shown that Hofstede’s cultural dimensions have implications for running scientific projects within different cultures in terms of management style and decision-making (Shore and Cross, 2005).

Research on the constructs culture and new product development (NPD) has suggested interference. The findings have underlined the importance of national culture to MNCs in a globalized world and to NPD in particular (Nakata and Sivakumar, 1996). The simultaneously articulated need for further empirical study is taken as an occasion to examine the processes implemented in NPD at German and Indian sites of three MNCs and analyse cases of practices that trace back to different national cultures.

Aspects of Inquiry

Following Ozer (2011), the aspects under study are grouped into three dimensions for NPD: strategy, organisation, and operations. Relevant subordinate aspects of these dimensions have been identified by a literature review focusing on Western NPD practices. Relevance was assigned according to whether the studies indicated the existence of cultural differences or expressed an expectation that culture has significant effects. As mentioned, there are few English studies on Indian NPD.
Hence, literature on Chinese and Hong Kong NPD was sometimes consulted as a proxy for Indian NPD.

Figure 4 illustrates how the strategic dimension covers the framework in which NPD is embedded. The second dimension is the organisational span within which NPD is integrated into a company. Depth development processes are covered by the operational dimension.

The first dimension, strategy, comprises the strategic dimensions of NPD and the involvement of top management in the NPD process.

Technology and innovation strategy should play a vital role in a company’s efficient integration of market-pull and technology-push (Brem and Voigt, 2009). Leiponen and Helfat (2010) state that the choice of innovation objectives also plays a significant role. Their empirical study found that in Western companies a greater breadth of innovation objectives correlates with greater new product success in terms of sales revenues. Another study found that Western firms tend to follow a balanced choice across several innovation objectives (Cooper et al., 2004a). Chinese firms use a less balanced set of innovation objectives; cultural differences concerning risk-adversity are mentioned as having an effect here (Ozer, 2011).

Cooper et al. (2004a) and Elenkov (2005) found that the degree of senior management support has noticeable effects on a firm’s NPD performance; senior

---

1Geographic and relative cultural proximity, as defined by Hofstede (2001), encouraged the decision to use China and Hong Kong as proxy countries for India. The purpose of using a proxy here is to outline the already detected cultural differences in NPD between Western and Asian countries.
management must be actively involved in designing and focusing NPD projects, show high commitment to new products, and provide support and empowerment to NPD project teams while avoiding micro-management. However, as suggested in Elenkov (2005), effective management for innovation is dependent on the ambient national culture. Ozer (2011) supports this thesis by pointing out that the perceived top management support in Western firms (in which 79% of managers are “best performers” (Cooper et al., 2004a) far exceeds the perception of top management support in Chinese firms (in which 23% of managers are in that category).

The organisation dimension refers to the

- functional organisation of NPD,
- integration of marketing and sales,
- team structures in R&D and NPD,
- hierarchical structures implemented in the R&D department,
- forms of rewarding and
- degree of formalisation.

These criteria will be explained below.

The literature describes many possibilities for organising NPD responsibilities in a firm. Research on manufacturing and service firms conducted by Griffin (1997) found that firms engage in an average of two different structures for organising NPD; producers of manufactured goods used even more. Accordingly, there is no one best way of organising NPD. Hence, this study examines whether NPD processes in Germany and India have different functional organisation preferences.

Ernst et al. (2010) elucidate the importance of a cross-functional integration of sales and marketing into the NPD process. The marketing inflow of customer and market information into the NPD process and participation in decisions about product positioning and features increase the success of new products (Wren et al., 2000; Griffin and Hauser, 1996). Involving sales in the conceptual and product development phases is a driver for NPD success (Ernst et al., 2010). Therefore, this study examines the integration of both functions into the NPD process in both countries to determine how netted these processes are.

The use of multifunctional teams is considered a best practice factor in Western NPD and is thus widely practiced in Western firms (Cooper et al., 2004a) and is positively related to NPD success (Griffin, 1997). This has been confirmed by studies on Chinese, Japanese, and Korean firms (Song and Thieme, 2006; Song and Noh, 2006). Hence, this study analyses the diversity and average age of NPD teams in both countries.
The Western literature states that minimising vertical complexity increases a firm’s innovative capabilities. Hierarchy and thus inequality amongst members of an organisation hinder change (Burns and Stalker, 1994). By contrast, Prakash and Gupta (2007) found that, in Indian manufacturing firms, hierarchy is seen to support innovation and has a significantly positive relationship with the number of innovations due to the variety of national cultures and their respective “preference for hierarchy” (Shane, 1992).

Western best practice firms use only non-financial rewards for successful NPD projects. Financial rewards are seldom used and are therefore not popular in Western firms (Barczak et al., 2009; Griffin, 1997). Another study, conducted against a different cultural background (Ozer and Chen, 2006), found that both financial and non-financial rewards are used in Hong Kong firms to motivate employees in NPD teams.

Formalisation refers to “the degree of work standardisation and the amount of deviation that is allowed from standards” (Aiken and Hage, 1966: 499). Formalisation is used to exert control over what is to be done and what is to be refrained from (Bodewes, 2002). From a Western perspective, an extensive and concrete set of rules in the workplace restricts an employee’s autonomy to define much of his or her own work, blocking employee initiative concerning how tasks could be executed differently or even better. Hence, a work environment of freedom gives employees the space to make decisions and share information in order to conceive new methods based on their own perspective (Ekvall, 1996; Grønhaug and Fredriksen, 1981). The Indian perspective again differs: formalisation is an important aspect of innovation, as Indian employees greatly value discipline and coordination through rules (Prakash and Gupta, 2007).

The last dimension, operations, comprises the NPD process, the idea sources, and creativity techniques as well as the market orientation of NPD processes. A formal, structured NPD process helps to move through the development of innovative products and is associated with best-practice firms (Barczak et al., 2009). A study found that, in 2004, about 70% of all participating firms had implemented a formal NPD process (Cooper et al., 2004c). Cooper et al. (2004c) stress that, though most businesses have such a process, it is the quality of the execution that drives NPD performance. While firms in both the United States and in Hong Kong use formal NPD processes, Asian companies use them less than their Western counterparts (Ozer and Chen, 2006).

Even in Western best-practice firms, almost 50% of ideas for new products come from random, informal sources. Such ideas tend to lack strategic fit and hence lack potential for realisation. Formally generated ideas arising from a strategic need are more likely to be successful in the marketplace (Barczak
et al., 2009). As idea sources account for a great deal of NPD success, this study examines which and how many sources are used for NPD in Germany and India.

A study by Cooper and Edgett (2009) looked at 160 firms in both the business-to-business (B2B) and business-to-consumer (B2C) markets, and examined how extensively the methods of NPD idea generation are applied. Among the sample firms, a multitude of techniques had been used extensively. The use of formal techniques has positive impacts on NPD processes (Barczak et al., 2009). Chinese firms, in particular, seem to focus on a smaller set of NPD techniques (Ozer, 2011). Grinstein (2008) found that the use of customer and competitor orientation has a positive effect on innovative capability in Western firms. Culture has impacts here as well; in countries with a high power distance or a high degree of individualism, the effect of market orientation on new product performance was found to be even stronger.

Methodology

This study employed a multiple case study based on nine face-to-face interviews across different multinational corporations who carry out research activities in Germany and India.² The case study follows an inductive and primarily interpretive logic, as it aims at generating a descriptive and explanatory framework of how national culture influences the practice of NPD in a globally dispersed R&D environment.

Study design

Considering social phenomena, case studies are regularly applied as a research method (Yin, 2003a, b). This method provides rich data and is particularly suited to research questions requiring a grounded understanding of social or organisational processes (Hartley, 2004). This study satisfies all the criteria listed by Yin (2003a): the researcher requires no control over the events, the research focuses on contemporary events, and it poses “how” and “why” questions. Thus, a case study strategy is particularly appropriate for this context. Further, a multiple case study was applied that treats the cases as independent units and thus forms a set of multiple holistic case studies (Yin, 2003a). The multiple case study method is less vulnerable to uniqueness than is a single case study (Yin, 2003a); it

²These data were used for a comparative study of Chinese and Indian innovation processes as well (published in the proceedings of the XXIV ISPIM Conference held in Helsinki, Finland, 2013).
produces “more robust, generalizable, and testable theory than single-case research” (Eisenhardt and Graebner, 2007: 27) and thus provides stronger evidence for theory building (Leonard-Barton, 1990). The replication of results across cases, either direct or literal, produces robust data and strong support for the theory derived (Yin, 2003a). A mixed-methods approach is used in order to utilise both qualitative and quantitative research and thus gain most complete understanding of the researched phenomenon (Johnson et al., 2007; Creswell, 2002). As the study is aimed primarily at gaining inductive insights, it uses qualitative research to discover and understand the procedural contrasts between German and Indian NPD. Quantitative research elements are utilised to investigate and test certain factors considered important in the extant Western literature in the context of a different cultural background (Johnson and Onwuegbuzie, 2004). Eisenhardt (1989) explains that case studies can provide both, quantitative data to build a theory’s foundation or to test theory, as well as qualitatively acquired data to build theory or to explain phenomena.

As “interviews are one of the most commonly recognized forms of qualitative research” (Mason, 2002: 63), this study conducted problem-centred interviews (PCIs). This method combines listening with interposing questions (Witzel, 2000). The PCI consists of a short questionnaire that collects the social characteristics of the interviewee; it breaks the ice between interviewer and interviewee, and provides guidelines that build an orientation framework and assure comparability among the interviews. A framework of pre-formulated lead questions forms a guideline for the interview (Witzel, 2000). On the quantitative side, standardised questionnaires with seven-item Likert scaling were incorporated into the dimensions at issue (Witzel, 2000). The questionnaire consists of open questions, and questions that can be analysed with descriptive statistics. For each case company, at least two interviews took place to ensure validity of the given information. All questions in the PCI were derived from literature. The full interview guideline can be found in the appendix of this paper.

The interviews were recorded and transcribed. Following Mayring (2000), the data were then analysed step-by-step. The applied categories are partially inductive and deductive. For the purpose of orientation, categories are grouped into sections following the aspects discussed in the interviews. This coding agenda was put together on a spreadsheet, and passages of the transcribed interviews were assigned to corresponding categories in order to make the interviews formally comparable. Finally, a cross-case synthesis was performed to determine similarities and patterns in the interviews. Case studies were grouped by country and examined for intra-group similarities and inter-group differences (Eisenhardt, 1989).
Units of analysis

This study’s aim is to gain insights into how NPD processes at different R&D sites of MNCs in Germany and Bangalore (India) differ and to what extent differences in national cultural backgrounds account for these differences. Hence, the case study units were selected according to the following criteria:

- The MNCs must have a Western origin (i.e. Europe or USA).
- There must be fully qualified R&D as well as NPD activities at both locations in Germany and India from the same business unit.

Based on these criteria, we identified 17 companies fulfilling these conditions. Two German technology-oriented MNCs and one US-based technology-oriented MNC, a direct competitor to one of the German companies, took part in our study.

Interviews were conducted personally on the correspondent companies’ premises in Germany and India. Interviewees were chosen according to the following criteria:

- Interviews can be conducted with at least one leading person in R&D.
- Participants must be full time employees of the company (no external staff).

Case A

This case involves a German tech company with several business segments and more than 100,000 employees worldwide. Its R&D is conducted at many locations worldwide, with operative R&D in Germany and India.

Case B

Case B examines the same MNC as Case A, but was accomplished in a completely different business segment.

Case C

This case involves a US tech company with subsidiaries in several countries worldwide. It also employs more than 100,000 employees and conducts R&D in centres around the world, with Germany and India hosting such centres. The same business segment used in Case A is the background of this analysis.

As shown in Chan et al. (2010), subnational regions have greater influence on management and performance in emerging countries than they do in developed countries. Hence, we decided to ensure comparability across cases by looking at only one region in India. Further, Manning (2008) indicates that S&E clusters like Bangalore feature a unique environment.
This case involves a German tech company with over 10,000 employees that primarily operates in the automotive industry. Operations and R&D are carried out globally as well, with subsidiaries in Germany and India.

9 out of 10 interviews took place in person; one interview was conducted via telephone, as the personal appointment had to be postponed. Each interview lasted 90 min to 120 min. Table 1 shows an overview of the times and locations of interviews in Germany and India.

<table>
<thead>
<tr>
<th>Case</th>
<th>Position</th>
<th>Location</th>
<th>Date of interview</th>
<th>Mode of interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Global Technology Leader</td>
<td>India</td>
<td>July 6, 2012</td>
<td>face-to-face</td>
</tr>
<tr>
<td>B</td>
<td>Research Group Leader</td>
<td>India</td>
<td>July 6, 2012</td>
<td>face-to-face</td>
</tr>
<tr>
<td>B</td>
<td>R&amp;D Group Leader</td>
<td>Germany</td>
<td>June 24, 2012</td>
<td>face-to-face</td>
</tr>
<tr>
<td>B</td>
<td>R&amp;D Group Leader</td>
<td>Germany</td>
<td>June 24, 2012</td>
<td>face-to-face</td>
</tr>
<tr>
<td>A</td>
<td>Research Group Head</td>
<td>Germany</td>
<td>July 27, 2012</td>
<td>face-to-face</td>
</tr>
<tr>
<td>C</td>
<td>R&amp;D Program Leader</td>
<td>India</td>
<td>July 9, 2012</td>
<td>face-to-face</td>
</tr>
<tr>
<td>C</td>
<td>Head of R&amp;D</td>
<td>Germany</td>
<td>July 19, 2012</td>
<td>face-to-face</td>
</tr>
<tr>
<td>C</td>
<td>R&amp;D Lab Manager</td>
<td>Germany</td>
<td>July 19, 2012</td>
<td>face-to-face</td>
</tr>
<tr>
<td>D</td>
<td>Head of R&amp;D</td>
<td>India</td>
<td>August 1, 2012</td>
<td>telephone</td>
</tr>
<tr>
<td>D</td>
<td>Director Product Development</td>
<td>Germany</td>
<td>July 18, 2012</td>
<td>face-to-face</td>
</tr>
</tbody>
</table>

**Case D**

This case involves a German tech company with over 10,000 employees that primarily operates in the automotive industry. Operations and R&D are carried out globally as well, with subsidiaries in Germany and India.

9 out of 10 interviews took place in person; one interview was conducted via telephone, as the personal appointment had to be postponed. Each interview lasted 90 min to 120 min. Table 1 shows an overview of the times and locations of interviews in Germany and India.

**Results and Discussion**

**Strategy**

NPD in both German and Indian R&D locations follow a broad and balanced set of strategic aspects. Figure 5 depicts the arithmetic means per aspect and country and the rating of the strategic dimension of the NPD process in both countries.

In the arithmetic averages, significant deviations between both countries can be detected in “Increase Profits” (deviation: 0.83), “Customer Satisfaction” (deviation: 0.75), “Market Penetration” (deviation: 0.58), and “Capitalising on New Technologies” (deviation: 0.42).

Hence, Indian NPD is more focused on delivering to the buyer’s satisfaction than on increasing profitability, while the opposite is the case for Germany. Increasing market penetration is more important to NPD in India, consistent with India’s Long-Term Orientation and the corresponding objective of strengthening their own market position (Hofstede, 2001). As India’s markets are developing and growing at a much faster pace than Germany’s, there is greater possibility that
participating companies take advantage within as well as with those markets (CIA, 2012a, 2012b). The ability to capitalise on new technologies shows a reversed image. In India, the still growing segment of resource-constrained consumers with little excess income to spend calls for no-frills products. Products are only considered as the required “value for money” (Zeschky et al., 2011: 39); product development takes this demand into consideration and attempts to deliver the same benefit with cheaper material or technologies or by excluding additional features. However, Germany can be described as a saturated market in which selling new products is facilitated by a technological superiority that offers additional value to customers. The most important strategic aspect for Indian NPD is “Customer Satisfaction” ($\bar{x} = 1.25$). In German NPD, the aspects “Increase Profits”, “Earnings”, “Customer Satisfaction”, “Establishing a Foothold in a New Market” rank in first place ($\bar{x} = 1.5$). German NPD rated 5.5 strategic aspects (median) “very important” or “important,” whereas India rated 4.5 strategic aspects (median) in this range. This supports the findings of previous studies that Western NPD follows a more balanced set of strategic aspects than does NPD in Asia (Cooper et al., 2004a; Ozer, 2011).

All interviewees in both countries stated that top management involvement in the NPD process is high, that they support the NPD process in general, and that top
management attends meetings held several times during the NPD process. In those meetings that usually happen when a milestone or a gate in the process is reached, the NPD team or project leader reports on progress. Management then proposes a “go,” “no-go,” or amendments. While all Indian contacts declared that those report meetings happen in determined intervals of $\bar{x} = 6.2$ times a year, two of the four German cases said that those reports are scheduled on-demand. In the two residual German cases, reviews happen in frequent and comparably short intervals of $\bar{x} = 8.6$ or 12 reviews per year. However, no investigated case in the present study indicates micro-management in the NPD processes by the top management.

Indian NPD tends to have determined intervals in its top management reviews. This is consistent with the observations made by Prakash and Gupta (2007), who found that employees in the Indian manufacturing sector prefer a formalised work environment, as it fosters discipline and coordination. However, this result diverges from India’s low preference for Uncertainty Avoidance (Hofstede, 2001). The finding that 50% of the German cases have no determined NPD review schedules also partly confirms the results in Ekvall (1996) and Grønhaug and Fredriksen (1981), who found a formulated work environment to be harmful to innovation processes in Western firms.

Organisation

Both Indian and German R&D subsidiaries mainly use project-based teams in their functional organisation of firm NPD; four of the five German and two of the four Indian contacts commented accordingly. Figure 6 shows the responses given in each country.

In two German cases and one Indian case, the NPD was organised in more than one way, congruent with the finding in Griffin (1997) that there is not one but several ways to organise NPD within a firm. Still, building project-based teams seems to be most common methodology in both countries.

Fig. 6. Functional organisation of NPD.
Given the data generated, it is not possible to determine a country-specific practice for integrating the marketing and sales functions into the NPD process. In three of four cases, both countries’ contacts said that marketing and/or sales are integrated. Interestingly, the extent to which those departments are integrated into NPD is congruent across countries and cases, implying that if marketing is integrated throughout the NPD process in Germany, it would also be integrated in India and if marketing or sales is only integrated at one specific stage (e.g., identifying market needs) in India, it would be the same in Germany. In only one of the four cases were mismatching answers given by the interviewees, suggesting that this facet of NPD is determined by corporate culture rather than by national culture.

With the exception of one R&D subsidiary per country, a heterogeneous workforce is employed in the R&D departments. As a result, NPD team structures in both countries and across all cases are functionally heterogeneous. As NPD is mostly a technical discipline, engineers account for the largest part of NPD team members. Moreover, technical disciplines are typically dominated by men, and female NPD team members are rare. Figure 7 illustrates that, in both aspects, there is little difference between German and Indian NPD teams.

![Figure 7](image-url)

Percentage of technical versus commercial background of team members/female and male team members.

Fig. 7. Make-up of NPD teams in Germany and India.
However, we recognized that the average age of NPD team members is significantly different when comparing India and Germany. Team members in India are on average of seven years younger than their colleagues in Germany. This can be attributed to India’s relatively young population and high availability of young graduates. The median age in India is 26.6 years, in Germany it is 44.9 years (CIA, 2012a, 2012b).

To investigate the hierarchy, the number of levels are counted for every R&D department. As suggested by the cultural willingness of Indian culture to accept a greater deal of ambiguity, only one of four cases in Bangalore indicated a distinct hierarchy and therefore a clear reporting structure in the R&D department. This single case is also the youngest R&D location in Bangalore, led by a German Head of R&D, which may account for the difference. This result contradicts the findings Prakash and Gupta (2007) and India’s high index value on Power Distance (Hofstede, 2001), suggesting that Indian NPD favours high vertical complexity.

In Germany and in the respective R&D subsidiaries, two of five respondents stated having a distinct hierarchy, while three interviewees said that they had a flat hierarchy, illustrating Germany’s position in the middle field (ranked 35 out of 53 countries) in Power Distance (Hofstede, 2001).

All polled R&D subsidiaries in both countries use a system of both monetary and non-monetary rewards for successful NPD projects, yet a significant difference exists concerning the non-monetary rewards given to the whole team. All four Indian cases use team dinners to motivate or reward the whole team, whereas only one respondent in Germany used such practices. This result is in line with India’s collectivistic culture and the emanating “we” consciousness (Hofstede, 2001). Only one case in India grants special monetary rewards to project leaders; in all other cases, project leaders and team members are rewarded the same way. Examples of non-monetary rewards include team lunches or dinners and more responsibility for successful project leaders. Monetary rewards are given either directly after contributing a significant part to a project or are included in annual performance rewards.

The extensive use of individual monetary rewards in Germany is inconsistent with the findings of Barczak et al. (2009) and Griffin (1997), who conclude that monetary rewards are not popular in Western firms. Ozer and Chen (2006) state that Hong Kong firms likewise use financial and non-financial rewards for NPD projects.

As R&D employees did not participate in this survey section, the “degree of formalisation” aspect could not be examined in this context.
Operations

A structured and determined NPD process is used by all the R&D subsidiaries examined. However, there is a structural difference in how rigidly it is adhered to. All German interviewees remarked that there is flexibility for process adaptation, whereas their Indian colleagues stated that the NPD process in use is to be followed strictly — or even religiously, as one interviewee put it. Adaptations to the process could be made or a less extensive process used because of time pressure, low (financial) importance of the project, and special process technology requirements. While companies in both countries use formal NPD processes, Indian NPD seems to follow them more rigidly than German NPD.

The NPD processes in both countries include almost the same number of steps. With a median of nine, German NPD processes include one step more than India’s. Which steps are included in the NPD processes is shown in Table 2. The process steps in this table are based on Griffin (1997).

These findings do not replicate the results of Ozer and Chen (2006). Whereas Hong Kong firms use their NPD process less than Western firms do, Indian NPD seems to use the NPD process more rigidly than their Western equivalents do. These findings for Germany and India diverge widely from what is suggested by their cultural Uncertainty Avoidance index scores (Hofstede, 2001), which point to contrary results on the rigidity of the processes used in these countries.

Interesting results are found regarding idea sources for NPD. On average, German R&D executives named 3.5 idea sources and Indian R&D executives 3.25 for NPD. In all cases, the importance of the creative potential of the employees was stressed. Three of the four cases in both Germany and India use their customers for idea input. Two of the four German cases also analyze competitors.

![Fig. 8. Rewards given for successful NPD projects.](image-url)
for ideas, whereas only one Indian R&D subsidiary utilises this source. Suppliers are widely consulted by all four cases in Germany, yet no Indian R&D department in the sample involves their suppliers in the process of generating or sourcing ideas. Figure 9 gives an overview of the distribution of idea sources per country.

In two of the four cases, German R&D executives named the company’s employees as the most important idea source. The remaining two cases consider all idea sources, internal and external, to be equally important. Three of the four Indian cases place equal weight on all the idea sources they use. One case, the R&D subsidiary with the German head, places emphasis on their own employees as the most important idea source.

Across the cases, the median number of creativity techniques used for NPD in Germany is 6 and 4.5 in India. In two cases, Germany scored higher than its Indian equivalent (Case A: +3, Case B: +6); in one case, the number of used creativity techniques was equal in both countries, and one Indian case scored higher by one technique. Figure 10 depicts the distribution across cases.

Figure 11 presents a detailed array of the used creativity techniques and the number of cases per country in which those techniques are used. Brainstorming and focus groups/group discussions are used across all cases, followed in frequency by the provocation technique, quality function deployment, and the Theory
of Inventive Problem Solving (TIPS resp. TRIZ). NPD conducted in Germany uses a wider set of creativity tools to generate ideas for new products. Again, this matches the findings in Ozer (2011) for China and indicates that Indian NPD also focuses on a smaller set of NPD techniques.

Two cases in Germany said that they use creativity techniques at several points during the NPD process, whereas this is true for only one case in India. The remaining cases apply those techniques solely in the front end of NPD.

In three cases and in total, Indian R&D executives are more market-oriented than their German equivalents. Figure 12 presents the scores per country and
aspect. German NPD seems to be based on a better understanding of the market (including customers and competitors), as German R&D executives scored higher in Categories 2 and 3. A substantial country difference in this regard can be found in the degree of customer valuation, with Indian R&D executives scoring 2.5 points higher in Categories 7 and 9.

The Indian contacts constantly stressed the high demands and special requirements of the Indian customer, whose satisfaction requires extra effort. This

![Creativity techniques in NPD across cases and per country.](image)

![Market orientation of NPD in Germany and India.](image)

Note: R&D executives were asked to rate how far the following statements apply; median scores (1 = “strongly agree,” 2 = “disagree,” 3 = “rather disagree,” 4 = “neither agree nor disagree,” 5 = “rather agree,” 6 = “agree,” and 7 = “strongly agree”); as all ratings were between 4 to 7, only that rating scale is shown in the figure.

Fig. 11. Creativity techniques in NPD across cases and per country.

Fig. 12. Market orientation of NPD in Germany and India.
may account for the high scores in 1, 7, and 9. Another driving factor is the relatively high combined score of Power Distance and Individualism in India.\(^4\) Those two cultural dimensions add weight to the importance of market orientation (Grinstein, 2007). India’s Long-Term Orientation quality explains why the customers’ interests outweigh the focus on the business’ bottom line. Long-term orientated cultures prefer to forge longer lasting relationships with business partners (Hofstede, 2001).

**Implications and Limitations**

**Contribution to theory and practice**

The findings of this study indicate that there are several differences between German and Indian NPD practices, the underlying reasons for which could be cultural, market-specific, or manifold. Other aspects and success factors of Western NPD seem, however, to be universally applicable to Indian R&D subsidiaries.

**Contribution to theory**

This study performs the first holistic comparison of German and Indian NPD practices and thus contributes to the body of literature that compares Western and Asian NPD practices. The findings highlight the aspects of Indian NPD that differ from Western NPD practices and present cultural and market-related interpretations. Differences between the countries have been detected, consistent with Griffith et al. (2000), who stated that standardisation is not appropriate for countries with different cultural types. This study also confirms the interference of national culture and NPD in MNCs (Nakata and Sivakumar, 1996), as divergences are ascribed to discordant national cultures.

According to our results, Hofstede’s dimensions cannot be applied by default to detect divergence in NPD practice. As seen above, our findings do not reflect Hofstede’s scores of both countries in several cases.

**Implications for practice**

Although the R&D department in India is just another corporate subsidiary, differences in processes and practices can be grave. The desire for a rigid process to regulate NPD and schedule top management confirmation or feedback poses an especially sharp contrast to German NPD practices. Contrary to that degree of

\(^4\)The combined index scores on Power Distance and Individualism are 102 for Germany and 125 for India.
process coordination, Indian R&D subsidiaries have a flat hierarchy. The younger NPD workforce (by almost seven years) and a balanced use of financial and non-financial rewards demand a different kind of personnel management. German executives coming to India to set up or lead NPD will have to rethink the role of the customer, as this factor is more highly valued there than in German NPD.

However, some aspects were shown to be applicable to both Western and Indian NPD. Both countries display support for NPD by top management across all cases. All cases across both countries show a structured process for NPD, with a similar number of steps taken by a heterogeneous NPD team. Both countries also display an equal degree of integration of their marketing and sales departments into NPD, though the shape of this aspect is related to the company’s preference.

Evidently, India offers great potential and talent for carrying out R&D and NPD, but Western firms locating development facilities in India’s industrial clusters must acknowledge the differences in order to understand and be able to deal with the behaviour of partners and employees. Whereas some practices may be transferred in a standardised matter, others will need adjustment if the Indian potential is to be used most efficiently. This knowledge will allow Western MNCs to amend their expectations and perceptions about NPD organisation in India.

Limitations and further research

The primary aim of this study is to examine the differences in NPD practices between German and Indian R&D subsidiaries and provide a starting point for an explanation of these. However, due to the study’s small sample, more extensive research will be needed to extend and refine the foundation laid by this paper. A potential bias might be the fact that not all MNCs were from the same country. Through the fact that all interviews were conducted in person and only one via telephone, we ensured a high openness regarding the innovation processes, and how they are really lived in each country. As pointed out by Nakata and Sivakumar (1996), Hofstede predicts aggregate behaviour but does not take into account individual behaviour. Thus, a larger case study sample may be better able to replicate the cultural predictions made by Hofstede (2001). We suggest examining country- and culture-specific NPD practices with regard to their NPD efficiency in order to provide better guidance as to whether the preferable option is to adjust or standardise NPD practices. Moreover, future research could also include the problem of coordinating between the companies’ headquarters and its subsidiaries. That kind of research will be in line with the seven major fields of future research in innovation management theory and practice (Horn and Brem, 2013). In particular, the relationship among frugal and reverse innovation created in India, corporations’ sustainability management, and their performance constructs should
be further investigated to determine their influence on corporate success (Brem and Ivens, 2013). The authors gratefully acknowledge the research support by Hans-Frisch-Stiftung (Nürnberg, Germany).

Appendix

PCI Interview Guideline

I Which job position do you have within the R&D department?

II What are your main tasks?

III How many years have you been in this company?

IV What do you think about the current market situation?

– Which strategy is applied to meet customers and competitors?
– Would you consider the strategy to be a pioneer, follower or late follower strategy?
– What is more prevalent in NPD processes: Market pull/Technology push?

STRATEGY

1 How important are the following aspects for the strategic direction of NPD?

<table>
<thead>
<tr>
<th></th>
<th>Very important</th>
<th>Important</th>
<th>Rather important</th>
<th>Neither nor insignificant</th>
<th>Rather insignificant</th>
<th>Insignificant</th>
<th>Very insignificant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase profits</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Earnings</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Market share</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Market penetration</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Capitalising on new technologies</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Combating major competitive entry</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Establishing a foothold in a new market</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
2 The value assigned to NPD internally is high enough.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Rather disagree</th>
<th>Neither agree nor disagree</th>
<th>Rather agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

3 Investments made in NPD are high enough.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Rather disagree</th>
<th>Neither agree nor disagree</th>
<th>Rather agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

- How did the investments made in R&D develop over the last years?

4 Newly developed products significantly contribute to the company’s turnover.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Rather disagree</th>
<th>Neither agree nor disagree</th>
<th>Rather agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

5 How high is the involvement of the Top Management in NPD?

- Does TM provide strong support for, empowerment to and authority over NPD team members?
- To what extent is the Top Management involved in day-to-day business and decisions of NPD?
- Does the Top Management make Go, No-Go decisions?
- How often do you have to report to the Top Management?

ORGANISATION

6 Is NPD rather steered centrally or decentrally?

<table>
<thead>
<tr>
<th></th>
<th>Absolutely central</th>
<th>Quite central</th>
<th>Rather central</th>
<th>Nor central neither decentral</th>
<th>Rather decentral</th>
<th>Quite decentral</th>
<th>Absolutely decentral</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
7 How is NPD set up in the firm?

- NPD with permanent staff members
- Project based NPD teams
- Each business unit’s general manager directs their own NPD efforts
- Other, please specify

8 Is the organisational structure in the R&D department rather functionally heterogeneous or homogeneous? (e.g., are colleagues from other departments present?)

- And what structure exists within the NPD project team?

9 Are Marketing and Sales integrated into NPD processes?

- If not, why?
- If yes, how?

10 Team structure

- How many people are working in R&D? And how many in the company? How many people work in NPD teams?
- What is the average age of people working in NPD teams?
- What is the gender allocation in NPD teams?
- What is the allocation of employees with a technical and employees with a business background?
- According to whom is the team leader appointed and what aspects are desired for such an individual?

11 How is the hierarchal structure within the R&D department?

12 Are rewards given for successful NPD projects?

- If yes, which?
- If not, why not?
- Are there distinct monetary/non-monetary rewards
- Are rewards given to the project only — or also to the members of the NPD team.
- Are rewards given individually or to the NPD team as a whole?

13 Is your organisation structured by strict rules or loose guidelines?

  Formalisation Inventory (with R&D employees, questionnaire, 7-item Likert-scale)
OPERATION

14 Does your organisation follow a well-defined, structured process for the development of innovative new products?

- If yes, please make a quick draft.
- In the case of something missing or no draft possible:
  Which steps are included?
  - Product line planning
  - Project strategy development
  - Idea/Concept generation
  - Idea screening
  - Business analysis
  - Development
  - Test and validation
  - Manufacturing development
  - Commercialisation
  - Other activities, please specify
- Is this process to be followed strictly or is it understood as a guideline?
- Which steps are the most important?
- Where do the ideas for NPD come from? Are they from internal and/or external sources?
- Which are the most important sources?

15 Which creativity techniques are applied?

- Which techniques are mainly used?
- Are you familiar with the following techniques/which do you use?
  - brainstorming
  - conjoint analysis
  - Provocation technique
  - Delphi methods
  - Attribute listing
  - focus groups and group discussions
  - morphological analysis
  - quality function deployments
  - synectics
  - brain writing
  - Others, please specify
In which phase of NPD are those techniques applied?

How market-oriented are processes that are carried out in NPD?

<table>
<thead>
<tr>
<th>Customer needs significantly determine the development of new products.</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Rather disagree</th>
<th>Neither agree nor disagree</th>
<th>Rather agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Our product and service development is based on good market and customer information.</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Rather disagree</th>
<th>Neither agree nor disagree</th>
<th>Rather agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>We know our competitors well.</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Rather disagree</th>
<th>Neither agree nor disagree</th>
<th>Rather agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>We have a good sense of how our customers value our products and services.</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Rather disagree</th>
<th>Neither agree nor disagree</th>
<th>Rather agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>We are more customer focused than our competitors.</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Rather disagree</th>
<th>Neither agree nor disagree</th>
<th>Rather agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>We compete primarily based on product or service differentiation.</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Rather disagree</th>
<th>Neither agree nor disagree</th>
<th>Rather agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The customer’s interest should always come first, ahead of the owners.</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Rather disagree</th>
<th>Neither agree nor disagree</th>
<th>Rather agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Our products/services are the best in the business.</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Rather disagree</th>
<th>Neither agree nor disagree</th>
<th>Rather agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I believe this business exists primarily to serve customers.</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Rather disagree</th>
<th>Neither agree nor disagree</th>
<th>Rather agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

References


Economist Intelligence Unit (2004). Scattering the seeds of invention: The globalisation of research and development.


